

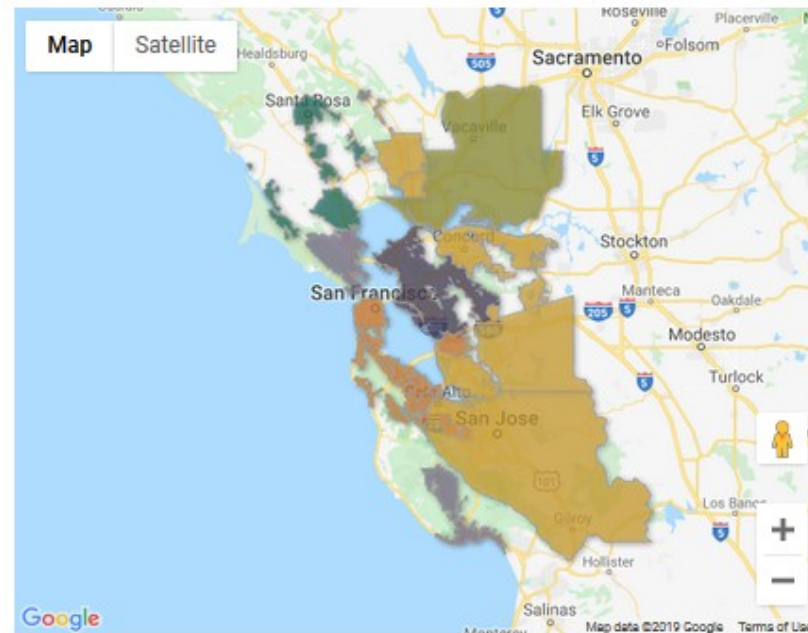
# **Water Project Presentation, San Francisco and the Bay Area.**

**By Ted Shapiro.**







# Overview.

I will briefly go over the water sources and infrastructure that supply the San Francisco Bay Area with its water, as well as the geography and history of the region. I will also cover the importance of water and water infrastructure to the region; additionally I will discuss current issues the region faces in regard to its water supply.

# Map Showing the San Francisco Bay area divided up according to major water source.

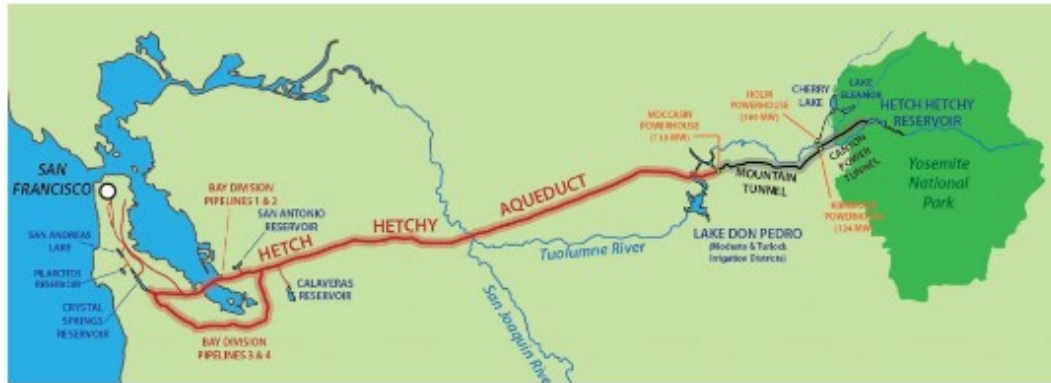


Color indicates the largest source of water for that district

 Hetch Hetchy Water System	 Mokelumne River System
 Sacramento-San Joaquin Delta	 Russian River Water System
 Local Watershed (Groundwater or Surface Water)	 Lake Berryessa

# The Hetch Hetchy water system.

The Hetch Hetchy system provides most of the drinking water for San Francisco and the Peninsula, as well for parts of the East Bay.

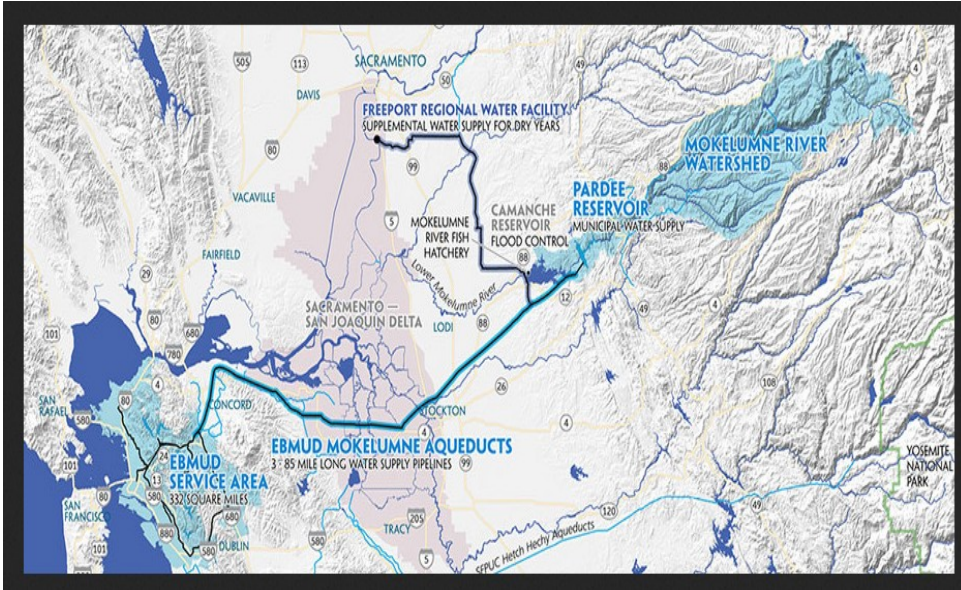


## Hetch Hetchy water system details.

- System: dams, tunnels, aqueduct, hydro power stations.
- Water source: Hetch Hetchy reservoir on the Tuolumne River in Yosemite National Park.
- Length of aqueduct: 167 miles.

# Mokelumne River Water System

## Mokelumne Aqueduct.



## Mokelumne water system details.

- Supplies water to 1.4 million people in the East Bay.
- Source: Pardee Dam on the Mokelumne river.
- System: Dam, reservoir, aqueduct.
- Length of aqueduct: 95 miles.

# Sacramento-San Joaquin

**Delta.**  
parts of the East and South Bay get some of their water from the delta.



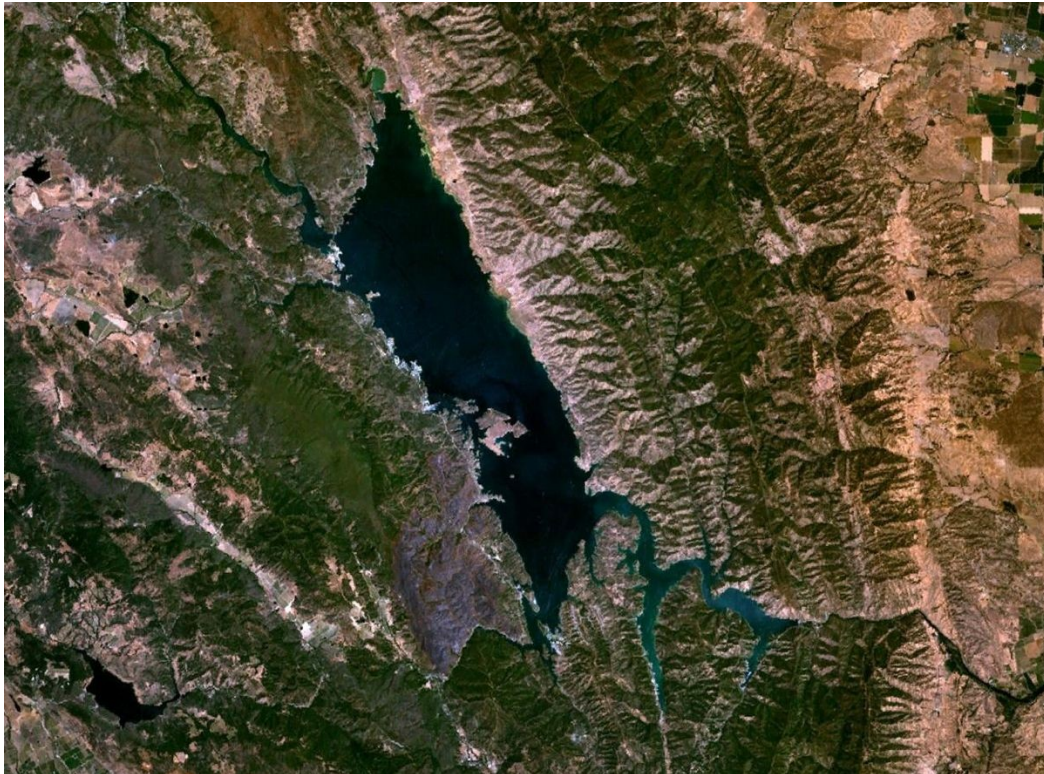
## System details.

- System: aqueducts, pipes, pumps.
- Source(s): Sacramento-San Joaquin delta.



# Lake Berryessa

**Parts of the North Bay get their water from Lake Berryessa on Putah Creek.**



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## **System details**

- Water source: Lake Berryessa on Putah Creek in Napa County.
- System: Monticello Dam.

# Russian River water system.

## Russian River.



## Russian River system details

- Russian river headwaters: Mendocino County.
- River length: 110 miles.
- Runs into the Pacific near Jenner in Sonoma County.
- Provides water for Sonoma and northern Marin Counties.



# Local Water supplies

## **Reservoirs on small local streams.**



## **Local water sources.**

- Some water districts, such as Marin Municipal Water District, rely on local water supplies. Small streams are dammed, or wells are drilled to supply local water needs.

# Geography of the San Francisco Bay Area.

- Geology and terrain.
- Climate.
- Vegetation.
- Human Geography.



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# Geology and terrain of the San Francisco Bay Area.

- The geology of the San Francisco Bay area is very varied, containing many terranes.
- The terrain is also very varied.
- Salt marshes around the bay.
- Freshwater marshes in the delta.
- Level valleys.
- Hills and mountains.



# Climate of the San Francisco Bay Area.

- The San Francisco Bay Area sits at the boundary of the Mediterranean and marine west coast climate zones, and therefore has a varied climate.
- Mediterranean climate has hot dry summers and cool rainy winters.
- Marine west coast climate has cool summers and wet winters.





# Vegetation of the San Francisco Bay area.

- The San Francisco Bay Area had and has extremely varied vegetation.
- The vegetation has been greatly altered over the last 200 years, but is still quite diverse, including marshes, oak woodlands, chaparral, red wood and Douglass fir forests, as well as mixed forests of various species.





# Human Geography of the San Francisco Bay Area.

Over the last two centuries humans have greatly altered the land, water, flora and fauna of the Bay Area. Marshes have been replaced by farmland, forests have been cut down, and cities, towns, roads, dams, aqueducts and power lines have been built across the landscape.



# History of the San Francisco Bay Area and its water.

For millennia, the Native Americans lived around the Bay, without altering the natural hydrological systems. The Spanish founded San Francisco on the site of a Native American village around the time of the American Revolution, but they did not greatly alter the natural hydrological systems either. The massive replumbing of the natural hydrological systems began during the California Gold Rush of 1849 when gold miners started diverting rivers to get water to wash sand and dirt off of the gold they were after. Some of the miners turned to farming and began to divert water from streams for their crops and livestock. Eventually, cities outgrew local water supplies and dams and aqueducts were built to bring in



# Importance of water and water infrastructure to California.

Due to the fact little precipitation falls in California during the growing season irrigation is vital for agriculture in California. Water must be captured, stored, and transported for agriculture to be feasible in California. Water is also vital for household use, as well as for many electrical power stations.



# Current issues (e.g., drought)

- Since about 2011, California has suffered through a number of unusually dry years.
- Water shortages for agriculture.
- Water shortages for municipal use.
- Water shortages for aquatic life.
- Severe wildfires.





# Climate change

The climate seems to be getting warmer and drier and it appears that this is due, at least in part, to human activities such as destroying forests (which reduces rainfall and water retention) and burning fossil fuels which releases carbon dioxide (a greenhouse gas) into the atmosphere.





# A brief history of deliberate weather modification.

- After the Civil War, the U.S. government engaged in weather modification experiments.
- In the 1890's for-profit weather modification companies operated in Kansas.
- Bernard Vonnegut invents silver iodide cloud nucleating technology in 1946
- During the Vietnam war, in "Operation Popeye," the U.S. military used weather warfare technology against the Vietnamese.
- Present day: a variety of for-profit weather modification companies and government sponsored programs have been and are operating. Some geoengineers have spoken out in favor of using stratospheric aerosols to cool the planet.

Are stratospheric aerosols a good idea? Have we been consulted?



I long for the lost skies of my childhood,  
when great white cumulus clouds floated in a clear blue sky over the wood.

But now I look up and all I see,  
are aluminum oxide grey wisps of cotton candy,  
and I wonder, who did this and why?  
Who stole the sky?

I long for the streams of my youth, when rainstorms nourished them all winter long;  
in my dreams I still hear the tree frog's song,  
but when I awake,  
all is silent, the streams are dry, and the land continues to bake.  
And I wonder, who did this and why?  
Who stole the sky?

I long for the clear blue sky of my childhood,  
which like a great upturned bowl stood,  
as a huge blue dome arched high above the Earth,  
this world of my nativity, the planet of my birth.  
I remember watching the jets flying ever so high,  
leaving short vapor trails which quickly vanished in the sky,  
but now the jet trails linger, spread, and obscure the sun.  
I am angry, but who do I fight, when I don't know who did what's been done?  
And I wonder, as I gaze up at the sky chariots trailing crappy fake clouds,  
like depressing grey funeral shrouds;  
Who did this and why?  
Who stole the sky?

# Credits:

- Sommer, L. (Feb. 28, 2014) *Bay Area: Do You Know Where Your Water Comes From?* Retrieved 11/26/2019 from <https://www.kqed.org/science/14623/bay-area-do-you-know-where-your-water-comes-from>
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